

# **SPECIAL OPTION**

H31-5327B

**MODIFICATIONS  
OPERATION AND  
SPECIFICATION  
CHANGES**



OPERATING AND SERVICE MANUAL  
MODIFICATIONS

H31-5327B

TIMER-COUNTER-DVM

## GENERAL

This special instrument is a standard HP Model 5327B Timer-Counter-DVM with added electrical modifications for special Option H31. Special Option H31 adds the following features:

**ADDED OPTIONS** — The following options are included in this special instrument. See the Operating and Service Manual for more information about these options.

1. Option 001 is added to provide an eight digit visual display. The BCD output from the eighth digit normally appears in output column eight of DIGITAL RECORDER connector J9. The BCD output from J9 column eight in this instrument is different as explained below under VALIDITY OF BCD OUTPUT DATA.
2. Option 003 is added to provide 8421 "1" state positive four-line character parallel BCD output data at DIGITAL RECORDER connector J9. See Tables 1A and 1B, on following pages, for connections to J9 and the BCD output code for polarity information. Option 003 is modified to remove overflow output data from annunciator output column nine.

The data lines for all four bits in J9 output columns eight and nine are connected in parallel to permit operation with terminal equipment having only eight data input columns. See explanation under VALIDITY OF BCD OUTPUT DATA.

3. Option 004 is added to provide extended remote programming capability. This option has a 50-pin REMOTE PROGRAM connector for J10. See details in Operating and Service Manual.
4. Option 011 is added to provide a high stability oscillator assembly for A4. This 10 MHz oscillator provides long term stability of  $5 \times 10^{-10}$  parts per day after a 24 hour warm up period.

**VALIDITY OF BCD OUTPUT DATA** — The 8421 "1" state positive output data in columns 1 through 7 of DIGITAL RECORDER connector J9 is the same as in a standard instrument and correspond to the first seven digits of the visual display in any operating mode.

The four output lines in columns eight and nine are connected in parallel so the output data is always the same in both columns. The BCD output from annunciator column 9 in this instrument is limited to polarity information only and does not contain overflow information. The front-panel overflow (OF) lamp functions normally even though no overflow output information appears at J9.

In the DVM, READ A, and READ B operating modes, digital information does not occur for the eighth digit; the digit remains blanked and all four output lines for column eight at J9 are in the high or "1" state. The polarity information in column 9 pulls the lines in column 8 low (0 state) as necessary for positive or negative polarity data as shown in Table 1B.

**REAR INPUT CONNECTORS** — Duplicate connectors are added on the rear for input to the digital voltmeter and channels A and B as follows:

1. The rear panel DVM INPUT connector is the same as the front panel connector. The two binding posts on the rear are wired in parallel with those on the front panel.
2. Two BNC connectors are added to permit signal input into channel A or B at the rear of the instrument. These added connectors are marked A INPUT and B INPUT.

The instrument is supplied with two 50 ohm resistive loads for terminating the front-panel input connectors when using the rear-panel connectors for signal input. The front-panel input connectors



**GENERAL (Contd)**

can be used for signal input by attaching the load resistors to the rear-panel input connectors. The instrument will have normal sensitivity over the standard frequency range as long as the input cables in both channels are terminated by the 50 ohm loads.

The lengths of coaxial cable used to connect the front and rear input connectors add approximately 35 pF in each channel. This added capacity and the unterminated cables will cause a loss in high frequency sensitivity and sensitivity will vary widely if the 50 ohm loads are removed for measurements in high impedance circuits. The rear-panel connectors can be disabled and the two input circuits on the front panel returned to normal by a simple change inside the instrument.

**RESTORING HIGH IMPEDANCE INPUT** — To restore the front-panel inputs to high impedance input circuits, disconnect the miniature connectors on the rear of input attenuator assembly A1 and clip the connectors into storage clips provided for this purpose. This disconnects the rear-panel input connectors and the interconnecting cables. The 50 ohm loads can be attached to the rear-panel connectors for storage.

The storage clips for the miniature connectors are fuse clips which are mounted on the side frame adjacent to A1. The connectors must be secured to prevent accidental short circuits or other instrument damage.

**ELECTRICAL MODIFICATIONS**

Electrical modifications exclusive of standard options for special Option H31 are as follows:

1. Option 001 to provide an eight digit display is added by installing a HP Part No. 05326-60025 circuit board for Display Assembly A9 as shown in the Operating and Service Manual for the standard instrument.

The BCD output data from the eighth digit normally appears in output column 8 of DIGITAL RECORDER connector J9 for Option 003. Wiring to J9 columns 8 and 9 is changed in this special instrument as described in the following paragraphs.

2. Option 003 is added to provide DIGITAL RECORDER output connector J9. Connections for the 8421 "1" state positive four-line parallel output data at J9 are given in Table 1A. The cable connecting J9 to the balance of the instrument has the two wires for overflow output in annunciator column 9 removed.

Option 003 has an additional modification consisting of parallel connections between the data lines for bits D, C, B and A in J9 columns 8 and 9. This parallel connection is indicated in Table 1A.

Column eight normally supplies digital information for the eighth digit added by Option 001. Column nine normally supplies annunciator output data for overflow or polarity. As shown by Table 1B, output data in columns 8 and 9 is the same and may provide polarity data or digital data for the eighth digit as explained in the GENERAL section of this manual addendum under the heading of VALIDITY OF BCD OUTPUT DATA.

3. Diodes A8CR2 and A8CR3 in Part No. 05326-60009 display support assembly A8 are removed. This prevents bits A and C of overflow data from appearing in annunciator BCD output column 9 but the front-panel overflow (OF) lamp functions normally. Only polarity information can now appear in annunciator BCD output column 9.
4. Attenuator assembly A1 is modified by adding two miniature 50 ohm coaxial connectors on the back side of the circuit board. These two HP Part No. 1250-0863 connectors are wired in parallel with front-panel input connectors J3 and J4.
5. The rear panel is modified by adding two BNC connectors for A INPUT and B INPUT plus a pair of binding posts for DVM INPUT. The binding posts for the rear-panel DVM INPUT connection are wired in parallel with the binding posts for the front-panel DVM INPUT connection.



## ELECTRICAL MODIFICATIONS (Contd)

6. Two HP Part No. 05326-91003 cable assemblies are used between the rear-panel BNC connectors and the miniature coaxial connectors added on assembly A1.
7. The counter is supplied with two HP Part No. 1250-0207 coaxial load resistors for terminating the 50 ohm line at the input to the counter circuits when the loads are connected to the front-panel input connectors.

TABLE 1. BCD OUTPUT CONNECTIONS  
MODIFIED OPTION 003 WITH OPTION 001  
FOUR LINE PARALLEL "1" STATE POSITIVE OUTPUT

TABLE 1A. DIGITAL RECORDER CONNECTOR J9

COLUMN AND FUNCTION	J9 PIN NUMBER			
	BIT D=8	BIT C=4	BIT B=2	BIT A=1
1 (10 <sup>0</sup> )	27	26	2	1
2 (10 <sup>1</sup> )	29	28	4	3
3 (10 <sup>2</sup> )	31	30	6	5
4 (10 <sup>3</sup> )	33	32	8	7
5 (10 <sup>4</sup> )	35	34	10	9
6 (10 <sup>5</sup> )	37	36	12	11
7 (10 <sup>6</sup> )	39	38	14	13
8 (10 <sup>7</sup> )	41, 43	40, 42	16, 18	15, 17
9 ANNUNCIATOR	41, 43	40, 42	16, 18	15, 17
POSITIVE INHIBIT (+5 Vdc) . . . . . 22				
NEGATIVE REFERENCE (GROUND) . . . . . 24				
POSITIVE REFERENCE (+5 Vdc 1K ohm source Z) . . . . . 25				
NEGATIVE PRINT COMMAND . . . . . 48				
GROUND . . . . . 24, 50				
No connection 19, 20, 21, 23, 44, 45, 46, 47, and 49				

TABLE 1B. ANNUNCIATOR BCD OUTPUT

ANNUNCIATOR INDICATION	BIT D=8	BIT C=4	BIT B=2	BIT A=1
NO OVERFLOW	none	none	none	none
OVERFLOW	none	none	none	none
+ POLARITY	H	L	H	L
- POLARITY	H	L	H	H
H = HIGH or "1" STATE L = LOW or "0" STATE				